

US-163
SEQUENCE LISTING

<110> TAKASHITA, Ryo
YASUEDA, Hisashi
GUNJI, Yoshiya

<120> METHOD FOR PRODUCING ALCOHOL BY USING MICROORGANISM

<130>

<150> JP 2001-270903
<151> 2001-09-06

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<170> PatentIn Ver. 2.0

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<213> Artificial Sequence

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<223> Description of Artificial Sequence:primer

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US-163

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US-163

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tagtataatc	gacaactcg	tccatccccg	tcggagcatt	cggataacgt	gctcatcggt	1320				
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taggtgtca	cgacctcgtc	ggaggttta	tgtccggtgt	tccgtacgt	catcgggcat	1440				
tcatcattca	tagaatgtgt	tacggaggaa	acaagta	atg gca ctt	agc acc gca	1495				
				Met	Ala	Leu	Ser	Thr	Ala	
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acc aag	gcc gcg	acg gac	gct gac	gct gcc	aat cgg gca	ccc acc	acc agc			1543
Thr Lys	Ala Ala	Thr Asp	Ala Leu	Ala Ala	Asn Arg	Ala Pro	Thr Ser			
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gtg aat	gca cag	gaa gtg	cac cgt	tgg ctc	cag agc	ttc aac	tgg gat			1591
Val Asn	Ala Gln	Glu Val	His Arg	Trp Leu	Gln Ser	Phe Asn	Trp Asp			
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ttc aag	aac aac	cgg acc	aag tac	gcc acc	aag tac	aag atg	atg gcg	aac		1639
Phe Lys	Asn Asn	Arg Thr	Lys Tyr	Ala Thr	Lys Tyr	Lys Met	Ala Asn			
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gag acc	aag gaa	cag ttc	aag ctg	atc gcc	aag gaa	tat gcg	cgc atg			1687
Glu Thr	Lys Glu	Gln Phe	Lys Leu	Ile Ala	Lys Glu	Tyr Ala	Arg Met			
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gag gca	gtc aag	gac gaa	agg cag	ttc ggt	agc ctg	cag gat	gcg ctg			1735
Glu Ala	Val Lys	Asp Glu	Arg Gln	Phe Gly	Ser Leu	Gln Asp	Ala Leu			
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acc cgc	ctc aac	gcc ggt	gtt cgc	gtt cat	ccg aag	tgg aac	gag gag	acc		1783
Thr Arg	Leu Asn	Ala Gly	Val Arg	Val His	Pro Lys	Trp Asn	Glu Thr			
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atg aaa	gtg gtt	tcg aac	ttc ctg	gaa gtc	ggc gaa	tac tac	aac gcc	atc		1831
Met Lys	Val Val	Ser Asn	Phe Leu	Glu Val	Gly Glu	Tyr Asn	Ala Ile			
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gcc gct	acc ggg	atg ctg	tgg gat	tcc gcc	cag gcg	gcg gaa	cag aag			1879
Ala Ala	Thr Gly	Met Leu	Trp Asp	Ser Ala	Gln Ala	Ala Glu	Gln Lys			
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aac ggc	tat ctg	gcc cag	gtg ttg	gat gaa	atc cgc	cac acc	cac cag			1927
Asn Gly	Tyr Leu	Ala Gln	Val Leu	Asp Glu	Ile Arg	His Thr	His Gln			
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tgt gcc	tac gtc	aac tac	tac ttc	gct aag	aac ggc	cag gac	ccg gcc			1975
Cys Ala	Tyr Val	Asn Tyr	Tyr Phe	Ala Lys	Asn Gly	Gln Asp	Pro Ala			
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ggt cac	aac gat	gct cgc	cgc acc	cgt acc	atc ggt	ccg ctg	tgg aag			2023
Gly His	Asn Asp	Ala Arg	Arg Arg	Thr Arg	Thr Ile	Gly Pro	Leu Trp	Lys		
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ggc atg	aag cgc	gtg ttt	tcc gac	ggc ttc	att tcc	ggc gac	gcc gtg			2071
Gly Met	Lys Arg	Val Phe	Ser Asp	Gly Phe	Ile Ser	Gly Asp	Ala Val			
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gaa tgc	tcc ctc	aac ctg	cag ctg	gtg ggt	gag gcc	tgc ttc	acc aat			2119
Glu Cys	Ser Leu	Asn Leu	Gln Leu	Val Gly	Glu Ala	Cys Phe	Thr Asn			
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ccg ctg	atc gtc	gca gtg	acc gaa	tgg gct	gcc aac	ggc gat	gaa			2167
Pro Leu	Ile Val	Ala Val	Thr Thr	Glu Trp	Ala Ala	Ala Asn	Gly Asp	Glu		
215			220		225		230			
atc acc	ccg acg	gtg ttc	ctg tcg	atc gag	acc gac	gaa ctg	cgc cac			2215
Ile Thr	Pro Thr	Val Phe	Leu Ser	Ile Glu	Thr Asp	Glu Leu	Arg His			
235			240		245					
atg gcc	aac ggt	tac cag	acc gtc	gtt tcc	atc gcc	aac gat	ccg gct			2263
Met Ala	Asn Gly	Tyr Gln	Thr Thr	Val Val	Ser Ile	Ala Asn	Asp Pro	Ala		

US-163

tcc gcc aag tat ctc aac acg gac ctg aac aac gcc ttc tgg acc cag Ser Ala Lys Tyr Leu Asn Thr Asp Leu Asn Asn Ala Phe Trp Thr Gln 250 255 260	2311
cag aag tac ttc acg ccg gtg ttg ggc atg ctg ttc gag tat ggc tcc Gln Lys Tyr Phe Thr Pro Val Leu Gly Met Leu Phe Glu Tyr Gly Ser 265 270 275	2359
aag ttc aag gtc gag ccg tgg gtc aag acg tgg gac cgc tgg gtc tac Lys Phe Lys Val Glu Pro Trp Val Lys Thr Trp Asp Arg Trp Val Tyr 280 285 290	2407
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cac cac gac ctg tat ctg ctg gct tat gcg ctg tgg ccg acc ggc ttc His His Asp Leu Tyr Leu Ala Tyr Ala Leu Trp Pro Thr Gly Phe 345 350 355	2551
ttc cgt ctg gcg ctg ccg gat cag gaa gaa atg gag tgg ttc gag gcc Phe Arg Leu Ala Leu Pro Asp Gln Glu Glu Met Glu Trp Phe Glu Ala 360 365 370	2599
aac tac ccc ggc tgg tac gac cac tac ggc aag atc tac gag gaa tgg Asn Tyr Pro Gly Trp Tyr Asp His Tyr Gly Lys Ile Tyr Glu Glu Trp 375 380 385 390	2647
cgc gcc cgc ggt tgc gag gat ccg tcc tcg ggc ttc atc ccg ctg atg Arg Ala Arg Gly Cys Glu Asp Pro Ser Ser Gly Phe Ile Pro Leu Met 395 400 405	2695
tgg ttc atc gaa aac aac cat ccc atc tac atc gat cgc gtg tcg caa Trp Phe Ile Glu Asn Asn His Pro Ile Tyr Ile Asp Arg Val Ser Gln 410 415 420	2743
gtg ccg ttc tgc ccg agc ttg gcc aag ggc gcc agc acc ctg cgc gtg Val Pro Phe Cys Pro Ser Leu Ala Lys Gly Ala Ser Thr Leu Arg Val 425 430 435	2791
cac gag tac aac ggc gag atg cac acc ttc agc gac cag tgg ggc gag His Glu Tyr Asn Gly Glu Met His Thr Phe Ser Asp Gln Trp Gly Glu 440 445 450	2839
cgc atg tgg ctg gcc gag ccg gag cgc tac gag tgc cag aac atc ttc Arg Met Trp Leu Ala Glu Pro Glu Arg Tyr Glu Cys Gln Asn Ile Phe 455 460 465 470	2887
gaa cag tac gaa gga cgc gaa ctg tcg gaa gtg atc gcc gaa ctg cac Glu Gln Tyr Glu Gly Arg Glu Leu Ser Glu Val Ile Ala Glu Leu His 475 480 485	2935
ggg ctg cgc agt gat ggc aag acc ctg atc gcc cag ccg cat gtc cgt Gly Leu Arg Ser Asp Gly Lys Thr Leu Ile Ala Gln Pro His Val Arg 490 495 500	2983
ggc gac aag ctg tgg acg ttg gac gat atc aaa cgc ctg aac tgc gtc Gly Asp Lys Leu Trp Thr Leu Asp Asp Ile Lys Arg Leu Asn Cys Val 505 510 515	3031
ttc aag aac ccg gtg aag gca ttc aat tga aacgggtgtc gggctccgtc Phe Lys Asn Pro Val Lys Ala Phe Asn	3081
520 525	
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US-163

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aac	aag	atg	tat	ttc	gtc	acc	ccc	cgc	tgg	aaa	cgc	ttg	acg	gaa	3285	
Asn	Lys	Met	Gly	Tyr	Phe	Val	Thr	Pro	Arg	Trp	Lys	Arg	Leu	Thr	Glu	
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tat	gaa	gcc	ctg	acc	gtt	tat	gcg	cag	ccc	aac	gcc	gac	tgg	atc	gcc	3333
Tyr	Glu	Ala	Leu	Thr	Val	Tyr	Ala	Gln	Pro	Asn	Ala	Asp	Trp	Ile	Ala	
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Gly	Gly	Leu	Asp	Trp	Gly	Asp	Trp	Thr	Gln	Lys	Phe	His	Gly	Gly	Arg	
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cct	tcc	tgg	ggc	aac	gag	acc	acg	gag	ctg	cgc	acc	gtc	gac	tgg	tcc	3429
Pro	Ser	Trp	Gly	Asn	Glu	Thr	Glu	Leu	Arg	Thr	Val	Asp	Trp	Phe		
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Lys	His	Arg	Asp	Pro	Leu	Arg	Arg	Trp	His	Ala	Pro	Tyr	Val	Lys	Asp	
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Lys	Ala	Glu	Glu	Trp	Arg	Tyr	Thr	Asp	Arg	Phe	Leu	Gln	Gly	Tyr	Ser	
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Ala	Asp	Gly	Gln	Ile	Arg	Ala	Met	Asn	Pro	Thr	Trp	Arg	Asp	Glu	Phe	
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Ile	Asn	Arg	Tyr	Trp	Gly	Ala	Phe	Leu	Phe	Asn	Glu	Tyr	Gly	Leu	Phe	
145					150					155				160		
aac	gct	cat	tcg	cag	ggc	gcc	cg	g	g	ccg	ctg	tgc	gac	gta	acc	3669
Asn	Ala	His	Ser	Gln	Gly	Ala	Arg	Glu	Ala	Leu	Ser	Asp	Val	Thr	Arg	
165					170					175						
gtc	agc	ctg	gct	ttc	tgg	ggc	ttc	gac	aag	atc	gac	atc	gcc	cag	atg	3717
Val	Ser	Leu	Ala	Phe	Trp	Gly	Phe	Asp	Lys	Ile	Asp	Ile	Ala	Gln	Met	
180					185					190						
atc	caa	ctc	gaa	cgg	ggt	ttc	ctc	gcc	aag	atc	gta	ccc	ggt	ttc	gac	3765
Ile	Gln	Leu	Glu	Arg	Gly	Phe	Leu	Ala	Lys	Ile	Val	Pro	Gly	Phe	Asp	
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gag	tcc	aca	gca	gtg	ccg	aag	gcc	gaa	tgg	acg	aac	ggg	gag	gtc	tac	3813
Glu	Ser	Thr	Ala	Val	Pro	Lys	Ala	Glu	Trp	Thr	Asn	Gly	Glu	Val	Tyr	
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Lys	Ser	Ala	Arg	Leu	Ala	Val	Glu	Gly	Leu	Trp	Gln	Glu	Val	Phe	Asp	
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tgg	aac	gag	agc	gct	ttc	tcg	gtg	cac	gcc	gtc	tat	gac	gcg	ctg	ttc	3909
Trp	Asn	Glu	Ser	Ala	Phe	Ser	Val	His	Ala	Val	Tyr	Asp	Ala	Leu	Phe	
245					250					255						
ggt	cag	tcc	gtc	cgc	cgc	gag	ttc	ttt	cag	cg	ctg	gct	ccc	cgc	ttc	3957
Gly	Gln	Phe	Val	Arg	Arg	Glu	Phe	Phe	Gln	Arg	Leu	Ala	Pro	Arg	Phe	
260					265					270						
ggc	gac	aat	ctg	acg	cca	tcc	ttc	atc	aac	cag	gcc	cag	aca	tac	tcc	4005
Gly	Asp	Asn	Leu	Thr	Pro	Phe	Phe	Ile	Asn	Gln	Ala	Gln	Thr	Tyr	Phe	
275					280					285						
cag	atc	gcc	aag	cag	ggc	gta	cag	gat	ctg	tat	tac	aac	tgt	ctg	ggt	4053
Gln	Ile	Ala	Lys	Gln	Gly	Val	Gln	Asp	Leu	Tyr	Tyr	Asn	Cys	Leu	Gly	
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US-163

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Thr Gly Lys Trp Leu Glu Pro Thr Ile Ala Ala Leu Arg Asp Phe Met	
325 330 335	
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Gly Leu Phe Ala Lys Leu Pro Ala Gly Thr Thr Asp Lys Glu Glu Ile	
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Thr Ala Ser Leu Tyr Arg Val Val Asp Asp Trp Ile Glu Asp Tyr Ala	
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Ser Ala Ile Asp Phe Lys Ala Asp Arg Asp Gln Ile Val Lys Ala Val	
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Leu Ala Gly Leu Lys Met Ser Val Asn Ser Asn	
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Ala Tyr Asp Ala Gly Ile Met Gly Leu Lys Gly Lys Asp Phe Ala Asp	
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Gln Phe Phe Ala Asp Glu Asn Gln Val Val His Glu Ser Asp Thr Val	
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Val Leu Val Leu Lys Ser Asp Glu Ile Asn Thr Phe Ile Glu Glu	
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Ile Leu Leu Thr Asp Tyr Lys Lys Asn Val Asn Pro Thr Val Asn Val	
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75 80 85	
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Val Asp Cys Asp Glu Ile Ser Glu Leu Leu Gly Arg Gln Phe Asn Val	
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Tyr Asp Phe Leu Val Asp Val Ser Ser Thr Ile Gly Arg Ala Tyr Thr	
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Leu Gly Asn Lys Phe Thr Ile Thr Ser Glu Leu Met Gly Leu Asp Arg	
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Lys Leu Glu Asp Tyr His Ala Met Ala Lys Leu Gly	
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Ile His Ser Asn Asp Thr Arg Asp Ala Trp Val Asn Lys Ile Ala Gln	
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Leu Asn Thr Leu Glu Lys Ala Ala Glu Met Leu Lys Gln Phe Arg Met	
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Asp His Thr Thr Pro Phe Arg Asn Ser Tyr Glu Leu Asp Asn Asp Tyr	
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US-163

Leu Trp Ile Glu Ala Lys Leu Glu Glu Lys Val Ala Val Leu Lys Ala	
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Arg Ala Phe Asn Glu Val Asp Phe Arg His Lys Thr Ala Phe Gly Glu	
70 75 80 85	
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Asp Ala Lys Ser Val Leu Asp Gly Thr Val Ala Lys Met Asn Ala Ala	
90 95 100	
aag gac aag tgg gag gcg gag aag atc cat atc ggt ttc cgc cag gcc	5114
Lys Asp Lys Trp Glu Ala Glu Lys Ile His Ile Gly Phe Arg Gln Ala	
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Tyr Lys Pro Pro Ile Met Pro Val Asn Tyr Phe Leu Asp Gly Glu Arg	
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Gln Leu Gly Thr Arg Leu Met Glu Leu Arg Asn Leu Asn Tyr Tyr Asp	
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Thr Pro Leu Glu Glu Leu Arg Lys Gln Arg Gly Val Arg Val Val His	
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Leu Gln Ser Pro His	
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Trp His Leu Leu Lys Arg Asp Glu Thr Tyr Ala Ala Tyr Ala Lys Asp	
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Gln Glu Gly Cys Ser Ile Ser Leu Glu Ser Ser Ile Arg Ala Val Thr	
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His Val Leu Asn Tyr Phe Gly Met Thr Glu Gln Arg Ala Pro Ala Glu	
80 85 90 95	
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Asp Arg Thr Gly Val Gln His Met Gln Arg Val	
100 1	
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His Thr Ile Thr Ala Val Thr Glu Asp Gly Glu Ser Leu Arg Phe Glu	
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Cys Arg Ser Asp Glu Asp Val Ile Thr Ala Ala Leu Arg Gln Asn Ile	
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Phe Leu Met Ser Ser Cys Arg Glu Gly Gly Cys Ala Thr Cys Lys Ala	
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US-163

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Leu Cys Ser Glu Gly Asp Tyr Asp Leu Lys Gly Cys Ser Val Gln Ala	
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ctg ccg ccg gaa gag gag gag gaa ggg ttg gtg ttg ttg tgc cg acc	6007
Leu Pro Pro Glu Glu Glu Glu Gly Leu Val Leu Leu Cys Arg Thr	
70 75 80	
tac ccg aag acc gac ctg gaa atc gaa ctg ccc tat acc cat tgc cgc	6055
Tyr Pro Lys Thr Asp Leu Glu Ile Glu Leu Pro Tyr Thr His Cys Arg	
85 90 95 100	
atc agt ttt ggt gag gtc ggc agt ttc gag gcg gag gtc gtc ggc ctc	6103
Ile Ser Phe Gly Glu Val Gly Ser Phe Glu Ala Glu Val Val Gly Leu	
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Asn Trp Val Ser Ser Asn Thr Val Gln Phe Leu Leu Gln Lys Arg Pro	
120 125 130	
gac gag tgc ggc aac cgt ggc gtg aaa ttc gaa ccc ggt cag ttc atg	6199
Asp Glu Cys Gly Asn Arg Gly Val Lys Phe Glu Pro Gly Gln Phe Met	
135 140 145	
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Asp Leu Thr Ile Pro Gly Thr Asp Val Ser Arg Ser Tyr Ser Pro Ala	
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Asn Leu Pro Asn Pro Glu Gly Arg Leu Glu Phe Leu Ile Arg Val Leu	
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200 205 210	
ccg ggc atg gcg ccg cgc tat ttc gtg gcc ggc ggc acc ggg ttg gcg	6439
Arg Gly Met Ala Pro Arg Tyr Phe Val Ala Gly Gly Thr Gly Leu Ala	
215 220 225	
ccg gtg gtc tcg atg gtg cgg cag atg cag gag tgg acc gcg ccg aac	6487
Pro Val Val Ser Met Val Arg Gln Met Gln Glu Trp Thr Ala Pro Asn	
230 235 240	
gag acc cgc atc tat ttc ggt gtg aac acc gag ccg gaa ttg ttc tac	6535
Glu Thr Arg Ile Tyr Phe Gly Val Asn Thr Glu Pro Glu Leu Phe Tyr	
245 250 255 260	
atc gac gag ctc aaa tcc ctg gaa cga tcg atg cgc aat ctc acc gtg	6583
Ile Asp Glu Leu Lys Ser Leu Glu Arg Ser Met Arg Asn Leu Thr Val	
265 270 275	
aag gcc tgt gtc tgg cac ccg agc ggg gac tgg gaa ggc gag cag ggc	6631
Lys Ala Cys Val Trp His Pro Ser Gly Asp Trp Glu Gly Glu Gln Gly	
280 285 290	
tcg ccc atc gat gcg ttg cgg gaa gac ctg gag tcc tcc gac gcc aac	6679
Ser Pro Ile Asp Ala Leu Arg Glu Asp Leu Glu Ser Ser Asp Ala Asn	
295 300 305	
ccg gac att tat ttg tgc ggt ccg ccg ggc atg atc gat gcc gcc tgc	6727
Pro Asp Ile Tyr Leu Cys Gly Pro Pro Gly Met Ile Asp Ala Ala Cys	
310 315 320	
gag ctg gta cgc agc cgc ggt atc ccc ggc gaa cag gtc ttc ttc gaa	6775
Glu Leu Val Arg Ser Arg Gly Ile Pro Gly Glu Gln Val Phe Phe Glu	
325 330 335 340	
aaa ttc ctg ccg tcc ggg gcg gcc tga accgggaaag taccgtgacc	6822

US-163

Lys Phe Leu Pro Ser Gly Ala Ala
345

accgagcagt tcccggccca attcctgcgt gaaatgatcg agcagctgga cgccagcatc 6882
caggagctcg cacgcaagga aaaggactt gcggcatccc tgggcacggg ccgggtcgcc 6942
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cctcccgccgc caatgccggg gaggcctata tcgcccagctg tcgcccggcgc cgcgaaaaaa 7122
cgaacaatcc tgaaacggag tcgacggta tcgttgggaa aaaggttatac tgtcgcccata 7182
ttttgt 7188